



Laboratory Monitoring in Hospice Care: Why, What, and When?

Daniel Krall,

PharmD candidate, Ohio Northern University

Bridget McCrate Protus,

PharmD, RPh, CGP, Clinical Pharmacist/
Drug Information Specialist, HospiScript Services



Safe and effective medication use is critical to quality patient care. Laboratory monitoring can be an important part of medication safety and efficacy. The goal of hospice care is to palliate symptoms rather than diagnose and cure disease, so routine laboratory assessment is greatly reduced and often suspended in hospice patients. In certain circumstances, monitoring parameters must remain in place to preserve patient safety and quality of life. There are three components of medication use that are important for healthcare professionals to understand: which medications generally require laboratory monitoring, signs and symptoms of medication adverse effects, and discussing medication risks and benefits with our patients.

Some medications have a narrow therapeutic index (NTI), meaning that only a small difference separates a therapeutic drug level from a toxic drug level. Laboratory monitoring helps healthcare professionals ensure the amount of drug in a patient's body stays in the safe range, between these two levels. Other medications call for lab assessments to detect adverse effects of therapy such as hyper- or hypokalemia, hypoglycemia, or excessive anti-coagulation. Situations warranting ongoing lab monitoring for patients receiving hospice care are listed in Table 1. Drug concerns vary according

Table 1. Laboratory Monitoring Parameters for Medications

Ongoing lab monitoring and patient assessment required		
Drug Concern	Parameter	Drugs
Bleeding risk	INR	Warfarin
Hypoglycemia	FBG*	Insulin
Thromboembolism	Hgb	EPO agents (Aranesp®, Procrit®)
Lab monitoring may be discontinued, but ongoing careful patient assessment required		
Drug Concern	Parameter	Drugs
Abnormal Movement	AIMS	Antipsychotics
Hepatotoxicity	LFTs	Amiodarone
Hyperglycemia	FBG*	Antipsychotics, corticosteroids, niacin
Hypoglycemia	FBG*	Oral hypoglycemics
Hyperkalemia	Serum K+	Aldosterone antagonists, potassium supplements, ACE-Is, ARBs
Hypokalemia	Serum K+	Diuretics
Metabolic effects	Lipids	Antipsychotics
Narrow therapeutic index (NTI)	Trough level	Carbamazepine, cyclosporine, digoxin, disopyramide, lithium, phenytoin, procainamide, quinidine, valproic acid, xanthines
Renal impairment	sCr and BUN	Digoxin, metformin
Rhabdomyolysis	Creatine kinase	Fibrates, statins
Thyroid dysfunction	TSH	Amiodarone, levothyroxine, liothyronine, liotrix, desiccated thyroid

to the pharmacologic activity profile of the medication: lab monitoring, parameter to monitor, and risks, are provided for each concern. Certain medications should always have lab monitoring or assessment for safe use.

While all of the medications in Table 1 have valid indications for assessing lab values, they do not absolutely require lab

monitoring to be used safely and effectively. When assessing lab values for these medications, they should be checked at least every six months. If a patient prefers not to have lab work and shows no signs of toxicity or adverse effects, lab monitoring may be discontinued.

The best way to maintain patient safety upon discontinuation of lab monitoring

is to be aware of signs and symptoms of toxicity from these medications (Table 2). Healthcare professionals must also educate families and caregivers about observing patients for these signs and evaluate risks versus benefits. Due to the risk of adverse effects, lack of palliative symptom benefit, and patient/caregiver desire to reduce the number of medications taken, in many cases the safest approach may be to simply discontinue the medication.

Lab monitoring is necessary for safe use of warfarin, erythropoietin-stimulating (EPO) agents, and insulin. This is due to the severity of adverse effects and risks associated with these drugs. Familiarity with signs of toxicity from these drugs and how often to monitor them is especially important (Table 3).

If a patient shows some sign or symptom of toxicity, an intervention is always warranted. Risk-versus-benefit decisions are an important aspect of this process. Some medications, such as statins and fibrates, provide no symptom management benefit and may be discontinued. The following steps should be taken upon sign or symptom of toxicity:

- Discuss symptoms with patient or caregiver
- Determine onset, description, severity, duration, and frequency of symptoms
- Review all potential causes of the patient's symptoms, both drug and disease related

If a drug or drug interaction can be identified as the most probable cause of symptoms:

- reduce the dose
- discontinue the medication
- consider alternative medications

To illustrate this process, imagine a hospice patient taking warfarin notices increased bruising; the first course of action is to discuss with the patient or caregiver when the bruising began and assess the severity of bruising. During this discussion, the objective is to identify precipitating factors associated with the symptom; decline in nutritional intake, a new medication or supplement, or worsening liver function may be increasing the anti-coagulation effects of warfarin. If something can be identified as causing the bruising, the solution is to correct this cause if possible. If no precipitating factor can be found, the warfarin dosage must be decreased. At this time, an INR would be needed to help guide dosage adjustments. In addition, a discussion with the patient or caregiver should include a review of why the patient is taking warfarin and whether or not it is necessary to continue. For example, patients taking

Table 2. Adverse Effects and Toxicity of Medications

Drug Class (Example)	Toxicity Concern	Signs of Toxicity
ACE-Inhibitors (lisinopril)	Hyperkalemia	Nausea, fatigue, muscle weakness or tingling, bradycardia
Aldosterone antagonists (spironolactone)	Hyperkalemia	Nausea, fatigue, muscle weakness or tingling, bradycardia
Amiodarone	Hepatotoxicity and Thyroid Dysfunction	Lethargy, peripheral edema, weight loss, cough, pleuritic pain
ARBs (losartan, valsartan)	Hyperkalemia	Nausea, fatigue, muscle weakness or tingling, bradycardia
Antipsychotics (haloperidol, olanzapine)	Abnormal movements	Akathisia, tongue protrusion, dyskinesia, dystonia
Carbamazepine	NTI	Excessive sedation, vomiting, mouth pain, bruising, bleeding
Corticosteroids	Hyperglycemia	Increased thirst, increased urination, nocturia
Cyclosporine	NTI	Hypertension, headache, recurrent infection, fluid retention
Digoxin	NTI	Nausea, vomiting, confusion, vision changes
Disopyramide	NTI	Confusion, agitation, urinary retention, palpitations
Diuretics (furosemide)	Hypokalemia	Dehydration, muscle weakness or cramping, palpitations
Fibrates (fenofibrate)	Rhabdomyolysis	Muscle pain and weakness, jaundice
Lithium	NTI, SIADH	Confusion, increased urination, muscle cramping and weakness, tremors
Metformin	Lactic acidosis	Nausea, vomiting, hyperventilation, lethargy, hypotension (increased risk of lactic acidosis with renal impairment; avoid use when CrCl <60ml/min)
Niacin	Hyperglycemia	Nausea, fever, malaise
Oral hypoglycemic (glipizide, glyburide)	Hypoglycemia	Diaphoresis, tachycardia, tremor, headache, nausea
Phenytoin	NTI	Blurred vision, ataxia, slurred speech, lethargy, nausea, vomiting
Potassium supplements	Hyperkalemia	Nausea, fatigue, muscle weakness or tingling, bradycardia
Procainamide	NTI	Chest pain, palpitations, acute diarrhea, fatigue
Quinidine	NTI	Chest pain, palpitations, tinnitus, fatigue
Statins (simvastatin, atorvastatin)	Rhabdomyolysis	Muscle pain and weakness, jaundice
Valproic acid	NTI	Lethargy, mental status changes, headache, nausea, vomiting
Xanthines (theophylline)	NTI	Tachycardia, tremor, gastrointestinal effects, headache

warfarin for primary prevention of stroke due to underlying atrial fibrillation may choose to discontinue or change to low dose aspirin therapy, while those taking warfarin for treatment of a recent DVT may choose to continue.

Recognition that bruising is a sign of warfarin toxicity was necessary to appropriately address the patient's symptom. Becoming familiar with signs of medication toxicity can prevent a large number of adverse effects,

especially for those medications with a narrow therapeutic index or prominent adverse effects. Recognizing these signs in hospice care is even more important, as laboratory monitoring is frequently reduced or discontinued. Knowledge of the proper way to monitor and assess patients on these medications can greatly improve the safety and quality of life for hospice patients.

Table 3. Recognizing Toxicity from Drugs Requiring Laboratory Monitoring

Drug/Class	Toxicity Concern	Signs/Symptoms of Toxicity	Monitoring and Frequency
Warfarin	Hypocoagulation	Bleeding, bruising, petechiae	INR every 2-4 weeks
EPO agents	Thromboembolism	Hgb levels should typically not exceed 10 g/dL	Hgb (CBC) every 2-4 weeks
Insulin	Hypoglycemia	Diaphoresis, tachycardia, tremor, headache, nausea	FBG daily or prior to any insulin injection

References

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2. Recommended laboratory monitoring for common medications. *Pharmacist's Letter/Prescriber's Letter* 2006;22(12):221250.